

I claim:

1. A method of determining the rate of replication or destruction of an infectious agent in a host organism, said method comprising:
  - (a) administering an isotope-labeled precursor molecule to said host organism for a period of time sufficient for the isotope label of said isotope-labeled precursor molecule to become incorporated into a biochemical component of said infectious agent;
  - (b) obtaining one or more biological samples from the host organism, wherein said one or more biological samples comprise the infectious agent or said biochemical component of said infectious agent;
  - (c) measuring the isotopic content, rate of change of isotopic content, pattern or rate of change of pattern of said isotopic content in said biochemical component; and
  - (d) calculating the rate of synthesis or breakdown of the biochemical component to determine the rate of replication or destruction of said infectious agent in said host organism.
2. The method of claim 1, wherein said biological sample is a tissue of the host organism.
3. The method of claim 1, wherein said biological sample is a bodily fluid of the host organism.
4. The method of claim 1, wherein said host organism is a mammal.
5. The method of claim 4, wherein said mammal is a human.
6. The method of claim 1, wherein said infectious agent is selected from the group consisting of bacteria, viruses, protozoa, yeast, and parasites.

7. The method of claim 1, wherein said infectious agent is human immunodeficiency virus, hepatitis B or C virus, or other clinically important virus.

8. The method of claim 1, wherein said biochemical component is selected from the group consisting of DNA, RNA, proteins, lipids, carbohydrates, and porphyrins.

9. The method of claim 1, wherein said isotopic label is selected from the group consisting of  $^{13}\text{C}$ ,  $^{14}\text{C}$ ,  $^2\text{H}$ ,  $^3\text{H}$ ,  $^{15}\text{N}$ ,  $^{35}\text{S}$ ,  $^{11}\text{C}$ , and  $^{35}\text{P}$ .

10. The method of claim 9, wherein said isotopic label is  $^2\text{H}$ .

11. The method of claim 1, further comprising collecting a plurality of biological samples from said host organism.

12. The method of claim 1, wherein measurement of the isotopic content and/or pattern or the rate of change of isotopic content and/or pattern in the biochemical component is performed by mass spectrometry.

13. The method of claim 3 wherein the fluid is selected from the group consisting of urine, blood, saliva, interstitial fluid, edema fluid, lacrimal fluid, inflammatory exudates, synovial fluid, abscess, empyema, cerebrospinal fluid, sweat, pulmonary secretions, seminal fluid, feces, bile, and intestinal secretions.

14. A method of identifying an antimicrobial or immunostimulatory effect of a drug agent, comprising:

- a) determining the rate of replication or destruction of an infectious agent in a host organism according to claim 1;
- b) administering the drug agent to said host organism; and

c) determining the rate of replication or destruction of the infectious agent in a host organism according to claim 1, wherein a decrease in the rate of replication or an increase in the rate of destruction of the infectious agent indicates an antimicrobial or immunostimulatory effect of the drug agent.

15. The method of claim 14, wherein the effect of said antimicrobial or immunostimulatory agent on the growth or death of the infectious agent in the host organism is used as a diagnostic test in clinical patient care or as a biomarker tool for drug discovery, development, or approval of an antimicrobial or immunostimulatory agent.

16. A method of identifying an antimicrobial or immunostimulatory effect of a drug agent, comprising:

a) determining the rate of replication or destruction of an infectious agent in a first host organism according to claim 1, wherein the drug agent has not been administered to said first host organism;

b) determining the rate of replication or destruction of an infectious agent in a second host organism according to claim 1, wherein the drug agent has been administered to said second host organism;

c) comparing the rate of replication or destruction of the infectious agent in said first and second host organisms, wherein a lower value for in the rate of replication or an increase in the rate of destruction of the infectious agent in the second host organism indicates an antimicrobial or immunostimulatory effect of the drug agent.

17. The method of claim 16, wherein the effect of said antimicrobial or immunostimulatory agent on the growth or death of the infectious agent in the host organism is used as a diagnostic test in clinical patient care or as a biomarker tool for drug discovery, development, or approval of an antimicrobial or immunostimulatory agent.

18. A kit for determining the rate of replication or destruction of an infectious agent in a host organism comprising

- a) an isotope-labeled precursor molecule, and
- b) instructions for use of the kit to determine the rate of replication or destruction of the infectious organism.

19. The kit of claim 18, further comprising a tool for administration of precursor molecules.

20. The kit of claim 18, further comprising an instrument for collecting a sample from a host organism.

21. A drug agent identified by the method of claim 14.

22. A drug agent identified by the method of claim 16.

23. An isolated infectious agent comprising an isotope labeled precursor molecule.

24. An isolated infectious agent comprising an isotope labeled biochemical component.

25. An isotope-labeled precursor molecule.

26. An isolated isotope-labeled biochemical component obtained from an infectious agent.

27. An isolated isotope-labeled biochemical component made by administering an isotope-labeled precursor molecule to said host organism for a period of time sufficient for the isotope label of said isotope-labeled precursor

molecule to become incorporated into a biochemical component of said infectious agent to produce the isotope-labeled biochemical component.

28. A drug agent identified by the method of claims 14 or 16.